

Computer Basics

Lecture 01: Introduction

Learning Outcomes

This course gives an overview about the principles and technologies of the computer hardware components in details:

- Motherboard, processors and memory
- Storage Devices
- Printers
- Network
- Etc...

Assessment

Theoretical

- 2 Mid tests (40%)
- Final Exam (40%)

Practical

- Group research (10%)
- Practical Test (10%)

Contents at a glance

(1) Identify The Computer

(2) Inside The Box

- 1) Motherboards
- 2) Processors
- 3) Memory
- 4) BIOS
- 5) Storage Technology
- 6) Power Supply

Contents at a glance

(3) Outside the Box

- 1) Ports, Cables, Connectors
- 2) Input Devices
- 3) Output Devices
- 4) Printers and Multimedia Devices
- 5) Laptops and Mobile Devices

(4) Networking Basics

References

CompTIA A+ Certification All-in-One For Dummies

CompTIA A+ Complete Study Guide Authorized Courseware, Second Edition

CompTIA A+ Certification Guide (220-901 and 220-902)

A+ Certification

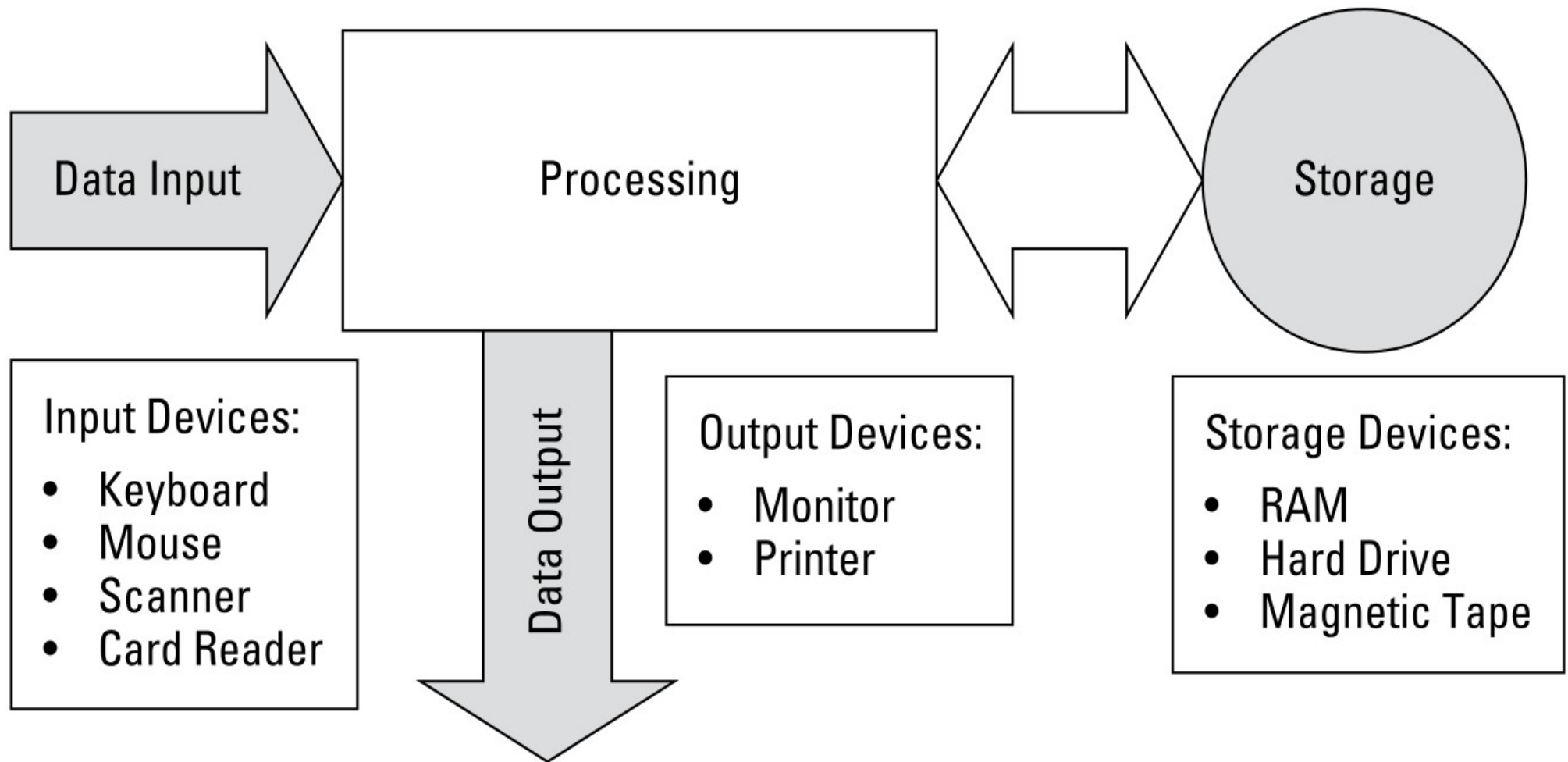
- ✓ The Computing Technology Industry Association (CompTIA)
- ✓ Created in 1982
- ✓ A+ start from 1993
- ✓ Latest version 2019: (220-1001) (220-1002)
- ✓ Expires in 3 years
- ✓ 2 exams, 90 minutes per exam
- ✓ Passing Score
 - 220-1001: 675 (on a scale of 100-900)
 - 220-1002: 700 (on a scale of 100-900)
- ✓ 219\$ per exam
- ✓ <https://certification.comptia.org/certifications>
- ✓

(1) Identifying the Computer

Computers are a major element of our society, and they exist in so many places that we tend to forget they are there. In simple terms, all computers are made up of four basic functions:

- » Data input
- » Data output
- » Processing
- » Storage

(1) Identifying the Computer



(1) Identifying the Computer

Computer History and Evolution

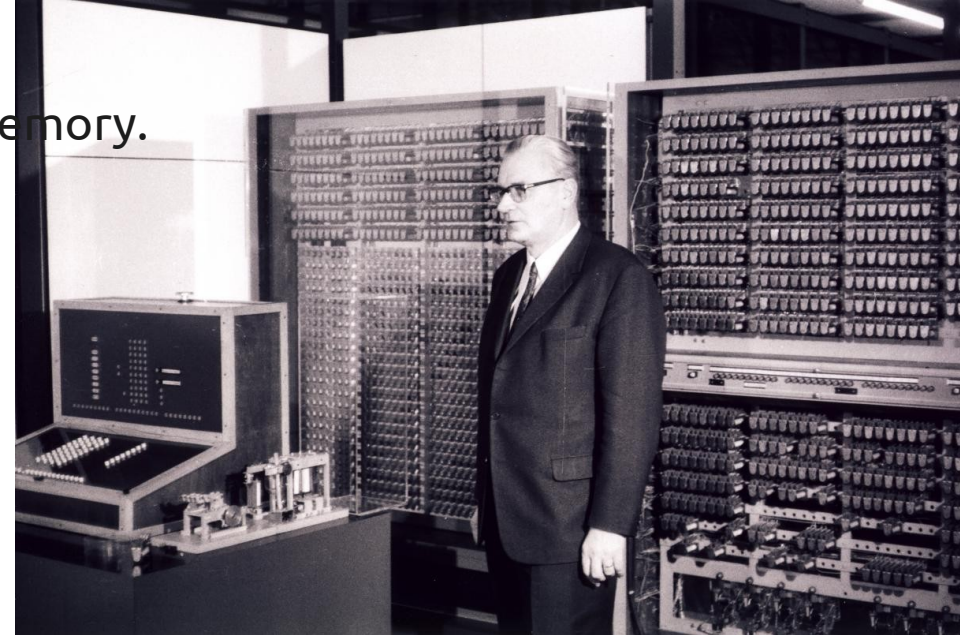
- In 1623 Wilhelm Schickard built the first mechanical calculator and thus became the father of the computing era. (supported arithmetic operations: $+$, $-$, \times , $/$) with six decimal digits



(1) Identifying the Computer

Computer History and Evolution

- 1941, Konrad Zuse completed his Z3, the first fully functional program controlled computer.
- Z3 was exclusively using electrical relays to
 - perform calculations,
 - store numbers (intermediate results) in memory.
 - control program execution



(1) Identifying the Computer

1- First Generation (Vacuum Tubes) (1940 – 1956)

- John von Neumann developed the first computer.
- Used vacuum tubes for circuitry and magnetic drums as primary internal storage medium
- Enormous in size, occupying entire room
- Limited internal storage capacity
- Consumed lot of electricity
- Heating Issues
- Used punched cards for input and printouts for output
- Used binary machine language, which is the lowest level programming language
- Could perform computations in milliseconds.

(1) Identifying the Computer

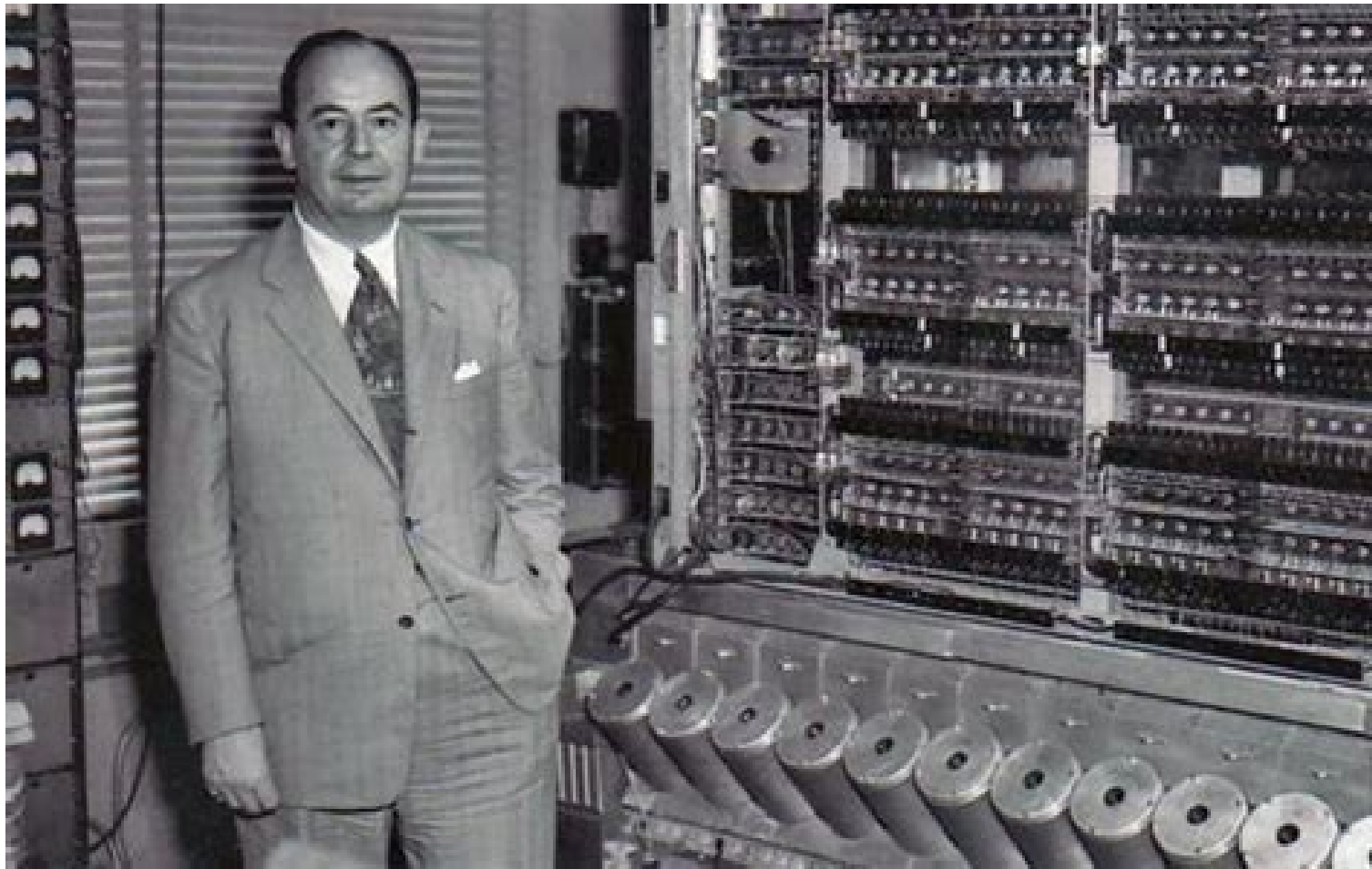
1- First Generation (Vacuum Tubes) (1940 – 1956)

- Primarily used for scientific computations
- Examples

ENIAC – Electronic Numerical Integrator And Calculator

UNIVAC – Universal Automatic Computer





(1) Identifying the Computer

2- Second Generation (Transistors) (1956 – 1963)

- Used transistors instead of vacuum tubes for circuitry, which enabled computers of this generation to become smaller, faster, cheaper and more energy-efficient
- Used magnetic core instead of magnetic drums as primary internal storage medium
- Higher internal storage capacity compared to first generation computers
- Computers of this generation too faced heating issues
- Computers of this generation too used punched cards for input and printouts for output
- Used Assembly Language

(1) Identifying the Computer

2- Second Generation (Transistors) (1956 – 1963)

➔ Mainly used for commercial production, scientific and engineering analysis and design

Examples

IBM 7094 series

IBM 1400 series

CDC 164



(1) Identifying the Computer

3- Third Generation (Integrated Circuits) (1964 – 1971)

- Used integrated circuits (IC) which had several transistors, mounted through small scale integration (SSI). This resulted in decrease in overall size and phenomenal increase in speed
- Less expensive as compared to computers of previous two generations and thus became accessible for masses
- Used keyboard and monitor instead of punched cards and printouts
- Used High-level programming language such as FORTRAN and COBOL

(1) Identifying the Computer

3- Third Generation (Integrated Circuits) (1964 – 1971)

→ Database management, automatic industrial control, airline reservation etc.

Examples

IBM 360 series

IBM 370 series



(1) Identifying the Computer

4- Fourth Generation (Microprocessors) (1971 – Present)

- Uses microprocessors with Very Large Scale Integrated (VLSI) circuits having about thousands of transistors
- Uses semi-conductor memories (RAM, ROM)
- Fastest, smallest and most reliable among all generations
- Least expensive among all generations
- Uses all high-level languages including C, C++ etc.

(1) Identifying the Computer

4- Fourth Generation (Microprocessors) (1971 – Present)

➔ Used in almost every field including space applications, business and art work

Examples

Apple Macintosh

IBM PC



Fourth generation computers are working from 1971 that work with the Microprocessors.

(1) Identifying the Computer

5- Fifth Generation (Artificial Intelligence) (Present and Beyond)

- Fifth Generation computing devices are still in development
- Will be superior to all previous generations in terms of speed, accuracy, storage capacity, overall size and versatility
- Will be capable of self-learning and reasoning
- Will understand natural language input such as spoken words and hand signals

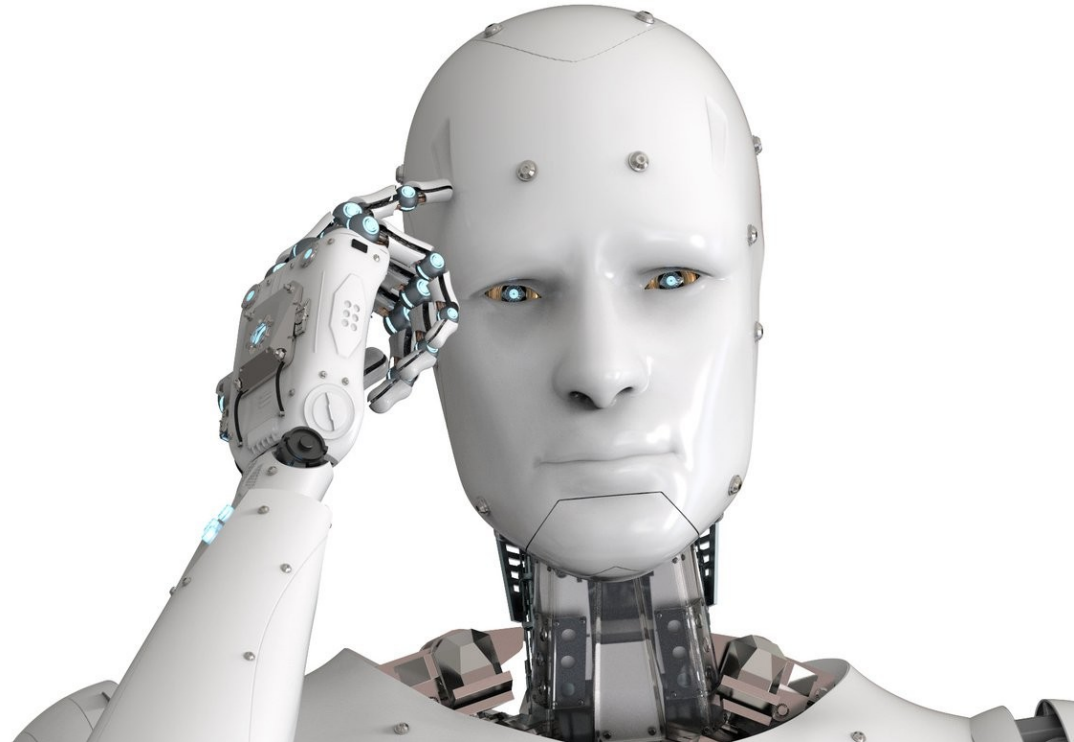
(1) Identifying the Computer

5- Fifth Generation (Artificial Intelligence) (Present and Beyond)

Examples

Voice Recognition Technology

Robots



(1) Identifying the Computer

Types of computers:

1) Super Computers:

Are the fastest and the most expensive computers. These huge computers are used to solve very complex science and engineering problems.

Supercomputers get their processing power by taking advantage of parallel processing; they use lots of CPUs at the same time on one problem.

A typical supercomputer can do up to ten trillion individual calculations every second



(1) Identifying the Computer

Types of computers:

2) Mainframe:

computers are similar to supercomputers in many aspects, the main difference between them is the fact that a supercomputer use all its raw power to focus on very few tasks, while a mainframe purpose is to perform thousands or millions of operations concurrently.

Due to its nature, mainframes are often employed by large organizations for bulk data processing



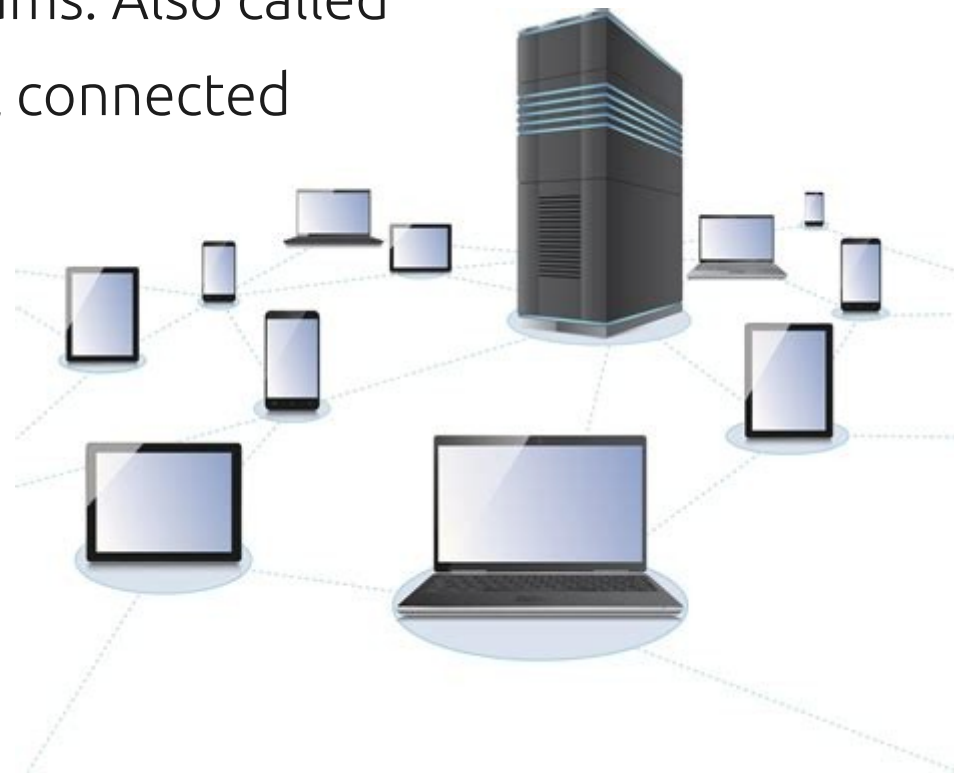
(1) Identifying the Computer

Types of computers:

3) Server Computer:

contains collections of data and programs. Also called a network server, this system allows all connected users to share and store electronic data and applications.

Example: wikipedia



(1) Identifying the Computer

Types of computers:

4) Workstations:

Are high-end, expensive computers that are made for more complex procedures and are intended for one user at a time.

Some of the complex procedures consist of science, math and engineering calculations and are useful for computer design and manufacturing.

Workstations are sometimes improperly named for marketing reasons. Real workstations are not usually sold in retail, but this is starting to change; Apple's Mac Pro would be considered a workstation

(1) Identifying the Computer

Types of computers:

4) Personal Computers:

PC is an abbreviation for a Personal Computer, it is also known as a Microcomputer. Its physical characteristics and low cost are appealing and useful for its users.

The capabilities of a personal computer have changed greatly since the introduction of electronic computers.

By the early 1970s, people in academic or research institutions had the opportunity for single-person use of a computer system in interactive mode for extended durations



(1) Identifying the Computer

Types of computers:

5) Mobile Computers

Your smart phone is a computer!
Smartphones are becoming faster and also have an increasing data capacity.



(1) Identifying the Computer

Types of computers:

6) Control Computers

a computer functioning in the control circuit of a process, machine, or system.

Control computers receive and process information in the control process and generate control information in the form of text, tables, or graphics printed on paper or displayed on a screen or in the form of signals fed to the actuating mechanisms of the controlled object.

Examples: factories , electricity control system, airports



(1) Identifying the Computer

Types of computers:

7) Special-Purpose Computers

computers that are built to perform specific tasks, such as ATM, playstation or washing machines



(1) Identifying the Computer

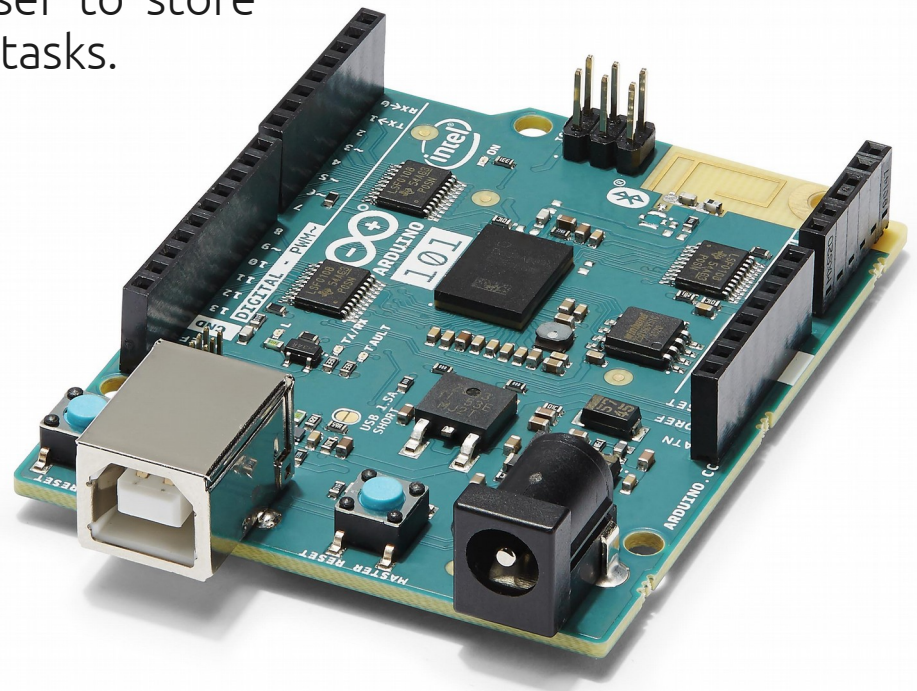
Types of computers:

8) Microcontrollers

Are mini computers that enable the user to store data and execute simple commands and tasks.

known as embedded systems

Example: Arduino



(1) Identifying the Computer

Units of Computer Memory Measurements

Unit Name	Abbreviation	size
Bit	bit	0 or 1
Nibble	n	4 bit
Byte	B	8 bit
Kilo Byte	KB	1024 byte
Mega Byte	MB	1024 KB
Giga Byte	GB	1024 MB
Terra Byte	TB	1024 GB
Peta Byte	PB	1024 TB
Exa Byte	EB	1024 PB
Zetta Byte	ZB	1024 EB
Yotta Byte	YB	1024 ZB
Bronto Byte	BB	1024 YB
Geop Byte	Geop Byte	1024 BB

Thanks For Attention